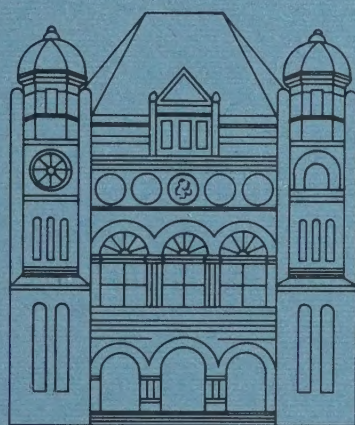


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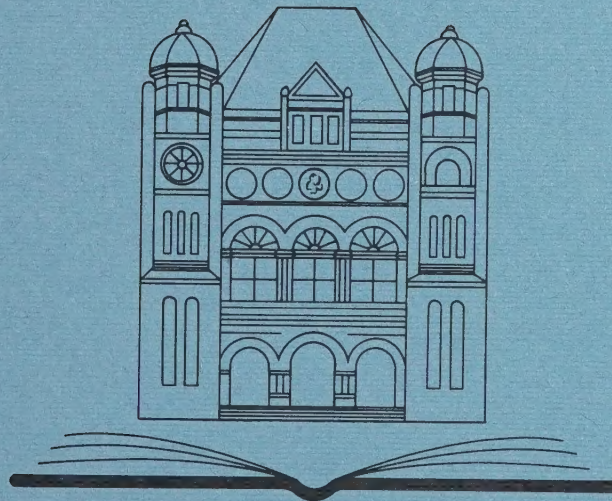


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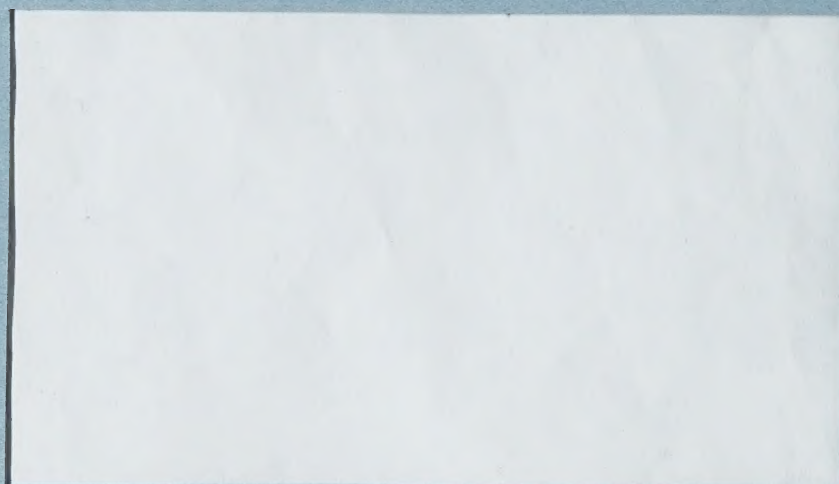
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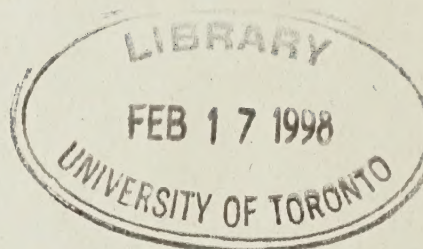
EXOTIC SPECIES IN ONTARIO

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INTRODUCTION

This Backgrounder addresses the problems encountered when non-native aquatic animals and plants (often termed *exotic or non-indigenous* species) are introduced to lakes, wetlands and rivers. These problems can be particularly complex for boundary waters, where coordination and cooperation between provincial, state and national governments and institutions must take place before successful control and prevention strategies can be implemented.

The damage caused by just one introduced species can be huge. In 1981, a comb jellyfish hitchhiked into the Black Sea from the USA in a ship's ballast. The new species disrupted the ecosystem to such an extent that, six years later, fish catches in the Black Sea had declined by 90 per cent.¹

What follows is an overview of the history and nature of the problem, a discussion of some of the more important introduced species in Ontario, and a look at some of the responses to concerns caused by some of these organisms.

Background

When a new species arrives in Ontario's waters or wetlands it must compete with native populations for food, resources and living space. The native species have advantages in already being adapted to their environment. On the other hand, a newly-arriving species may have an edge when it has no specific predators to keep its numbers under control. The outcomes of such introductions are very difficult to predict.

The Ontario Legislative Assembly's Standing Committee on Resources Development examined problems associated with exotic species in 1991, largely due to increasing concern over the spread of the zebra mussel in Ontario's waters, and purple loosestrife, a non-native invasive plant, in coastal and river wetlands. The Federation of Ontario Naturalists suggested to the Committee that plant and animal invaders (including microorganisms) can be divided into three categories:²

- **Natural invaders** - which establish sustaining populations in Ontario as a function of natural range extension or in response to changing habitat conditions due to human activities such as farming, forestry, urbanization, wildlife feeding, etc.;

¹ Fred Pierce, "Species invasions 'are beyond our control'," *New Scientist* 151:2037 (6 July 1996):4.

² Ontario, Legislative Assembly, Standing Committee on Resources Development, *Report on Exotic Species in Ontario* (Toronto: The Committee, 1991), pp. 2-3.

- **Accidental invaders** - including species such as the zebra mussel and purple loosestrife, which establish sustaining populations in Ontario as a secondary or unintended result of human endeavour; and
- **Intentional invaders** - which comprise non-native introductions of species not present prior to European colonization as well as re-introductions of species which were once native but had become extirpated. This category includes many species which have been introduced or re-introduced for wildlife or fishery management purposes, for game farms, ornamental plants, etc.

In practice, populations of species from all three categories have the potential to develop in unexpected and economically significant directions. Smaller, innocuous species such as microorganisms and small invertebrates may pose particular risks, since they may initially be less noticeable and potential impacts are less likely to be anticipated when they encounter new habitats and neighbouring species. The zebra mussel initially fell into this category.

History of Invasions

Ontario's waters have been subject to invasions by aquatic species since the early 1800s. With increased human activity, the rate of introductions has increased. In the Great Lakes, for example, almost one-third of the introductions have occurred in the last 30 years or so, a period that coincides with the opening of the St. Lawrence Seaway in 1959.

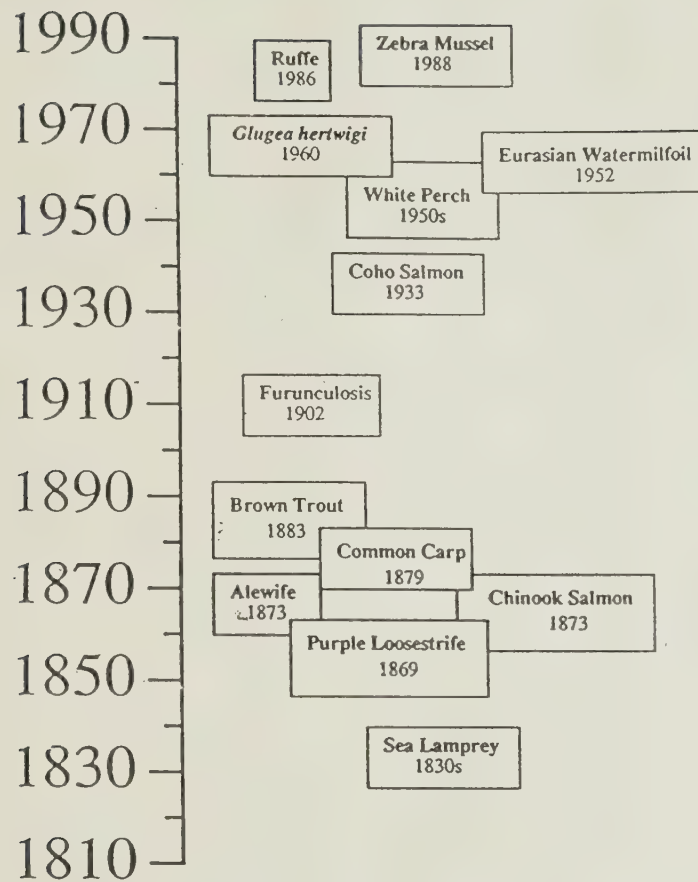
By the 1990s, 139 non-indigenous aquatic species had been identified as established in the Great Lakes. These include aquatic plants, fishes, algae, mollusks, worms, crustaceans and other organisms. Most have come from Eurasia (55%) and the Atlantic coast (13%). Figure 1 summarizes those with the most impact.³

These non-native species have arrived in a variety of ways, including unintentional escapes, releases from ships discharging ballast water, deliberate releases, migration through and along canals, and migration along railroads and highways. Unintentional releases (29%) and releases associated with shipping (29%) are the most common means of introduction.⁴

³ Mills, E.L., J. Leach, J. Carlton and C. Secor, "Exotic species in the Great Lakes: a history of biotic crises and anthropogenic introductions," *Journal of Great Lakes Research* 19:1 (1993): 43-44.

⁴ Ibid.

FIGURE 1



A timeline of exotic species introductions considered to have substantial impacts on the Great Lakes resource.

Some Specific Invaders

- **Zebra mussel:** became established in 1988; fouls hard natural and artificial surfaces; blocks water intakes; covers rocks, boats, and other structures unless measures taken; affects aquatic food webs and aquatic habitats.
- **Purple loosestrife:** arrived in 1869 but has recently become prolific and widespread; competes with native plants, causing habitat loss for waterfowl and other animals and birds.
- **Eurasian ruffe:** competes with more valuable native fish species. First noticed in 1986.
- **Eurasian milfoil:** appeared in 1952; competes with native plants; affects recreational use of water.⁵

PREVENTION AND CONTROL

Prevention

Preventing non-native species from being introduced is far more effective than subsequent attempts to eliminate them. Once established, efforts to slow their spread or expensive site-by-site treatment measures are often the only recourse.

Ontario has active communication initiatives underway, including brochures, fact sheets, boaters' signs and a section in the *Fishing Summary* to increase public awareness. In partnership with the Ontario Federation of Anglers and Hunters and the Canadian Coast Guard, Ontario has established an *Invading Species Hot Line* with very knowledgeable staff (1-800-563-7711) and a touring Boat Wash Demonstration to raise public awareness and help slow the spread of exotic species. Ontario is also working cooperatively with other provinces, the Federal Government, and American agencies on exotic species initiatives. Examples include research into possible biological control of purple loosestrife using imported beetles or other organisms, and annual conferences to exchange research findings and practical mitigating measures related to zebra mussel infestations.

Ballast Water

Since so many of the non-native species appear to have been introduced by means of water taken on by ships in other parts of the world and released in North American waterways, Ontario has actively lobbied the Canadian

⁵ Mills, E.L., J. Leach, J. Carlton and C. Secor, "Exotic species and the integrity of the Great Lakes," *BioScience* 44:10 (November 1994): 672.

Government to introduce ballast water legislation and to develop effective means of treating ballast water.⁶ The Federal government has committed to introducing such legislation, but the date is yet uncertain.⁷ This would replace existing voluntary guidelines introduced by the U.S. and Canadian Coast Guards in 1990, guidelines which became law in the United States in 1993.

The American Coast Guard currently stops and inspects all shipping entering the St. Lawrence Seaway to ensure that ballast water has been exchanged. As well, the Canadian and American Coast Guards have set up a demonstration project to explore methods of filtering or treating ballast water. This would be of value in circumstances where ship design or weather conditions would make offshore ballast exchange impractical or hazardous.

Control

Prevention does not always work and some non-native species have become firmly established. Various efforts have been mounted to control further spread.

For both large scale industrial water users and cleaning of recreational boats, the use of chlorine is the approved chemical method of destroying juvenile, and to a lesser extent, adult zebra mussels. A broad range of coatings, electric shock devices, mechanical filters, mechanical cleaning and other strategies are being explored. Although success has been mixed, these may find uses in particular applications. With respect to purple loosestrife, hand pulling, herbicide application and possibly biological control may be effective in certain situations. To date, no fully effective approach has been developed for large scale use.

However, with most new species that become established, it appears likely that they will become a permanent feature in Ontario's ecosystems. In many cases, a balance will be reached with native species as the number of predators which feed on them increases, either naturally or as a result of deliberate importation of species from the pests' region of origin.⁸ The latter approach involves its own set of risks.

THE FUTURE

Prevention of future introductions of additional non-indigenous species into inland lakes and boundary waters is a daunting task; one which will require

⁶ A. Locke et al., "Ballast exchange as a means of controlling dispersal of freshwater organisms by ships," *Canadian Journal of Fisheries and Aquatic Sciences* 50 (1993): 2086-2093.

⁷ Ontario, Ministry of Natural Resources, "Exotic species introductions," *House Note*, 18 March 1996, p. 1.

⁸ David W. Barr, "Our friend the zebra mussel," *Rotunda* (Fall/Winter 1996): 9-15.

active communication among all affected jurisdictions and strong co-operation of the public in Canada and the United States.

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